Body Image Disturbance in Surgically Treated Head and Neck Cancer Patients: A Prospective Cohort Pilot Study

Evan M. Graboyes, MD1,2, Elizabeth G. Hill, PhD2,3, Courtney H. Marsh1, Stacey Maurer, PhD2,4, Terry A. Day, MD1, and Katherine R. Sterba, PhD, MPH2,3

Sponsorships or competing interests that may be relevant to content are disclosed at the end of this article.

Abstract
This prospective cohort pilot study sought to characterize the short-term temporal trajectory of, and risk factors for, body image disturbance (BID) in patients with head and neck cancer (HNC). Most patients were male (35/56), had oral cavity cancer (33/56), and underwent microvascular reconstruction (37/56). Using the Body Image Scale (BIS), a validated patient-reported outcome measure of BID, the prevalence of BID (BIS ≥10) increased from 11% preoperatively to 25% at 1 month postoperatively and 27% at 3 months posttreatment (P < .001 and P = .0014 relative to baseline, respectively). Risk factors for BID included female sex (odds ratio [OR], 4.8; 95% confidence interval [CI], 1.3-19.8), pT 3 to 4 tumors (OR, 8.9; 95% CI, 2.0-63.7), and more severe baseline shame and stigma (OR, 1.06; 95% CI, 1.01-1.13), depression (OR, 1.25; 95% CI, 1.06-1.51), and social isolation (OR, 1.21; 95% CI, 1.01-1.49). The prevalence and severity of BID increase immediately posttreatment. Demographic, oncologic, and psychosocial characteristics identify high-risk patients for targeted interventions.

Keywords
head and neck cancer, body image, patient reported outcomes, survivorship, disfigurement, quality of life

Received October 8, 2018; accepted February 13, 2019.

Head and neck cancer (HNC) arises in cosmetically and functionally critical areas, resulting in life-altering disfigurement, difficulty swallowing, and challenges speaking.1,2 As a result, HNC survivors express high rates of body image disturbance (BID), a multidimensional construct characterized by a displeasing self-perceived change in appearance and/or function.3,4 Although BID is associated with significant psychosocial morbidity and decreased quality of life,7,8 significant gaps about its epidemiology remain. This knowledge gap about the temporal trajectory of, and risk factors for, BID in surgically managed HNC patients7,8 precludes delivery of optimally timed, preventative, and therapeutic interventions targeted to high-risk patients. This pilot study aims to test the hypotheses that (1) BID increases in prevalence and severity in the short term following treatment, and (2) demographic, oncologic, and psychosocial characteristics identify a high-risk subset of patients.

Methods
This prospective cohort study was approved by the Medical University of South Carolina Institutional Review Board. Included patients were ≥18 years old with surgically treated HNC. Participants were recruited from a multidisciplinary HNC clinic at a single academic medical center using a purposive enrollment strategy to stratify across hypothesized risk factors. Seventy patients enrolled; mortality (n = 7) and lost to follow-up (n = 7) resulted in a final cohort of 56 patients.

Sociodemographic,9 comorbidity,10 and oncologic data were collected. Psychological, emotional, social, and functional characteristics were assessed with the following validated patient-reported outcome measures (PROMs): Shame and Stigma Scale,11 PROMIS-SF v1.0–Depression 4a and Anxiety 4a,12 PROMIS-SF v2.0–Social Isolation and Satisfaction with Social Roles and Activities 4a and 4a,13 and Performance Status Scale–Head and Neck.14 The primary outcome measure was the Body Image Scale (BIS), a

1Department of Otolaryngology–Head and Neck Surgery, Medical University of South Carolina, Charleston, South Carolina, USA
2Hollings Cancer Center, Medical University of South Carolina, Charleston, South Carolina, USA
3Department of Public Health Sciences, Medical University of South Carolina, Charleston, South Carolina, USA
4Department of Psychiatry and Behavioral Sciences, Medical University of South Carolina, Charleston, South Carolina, USA

This article was presented at the AAO-HNSF 2018 Annual Meeting and OTO Experience; October 7-10, 2018; Atlanta, Georgia.

Corresponding Author:
Evan M. Graboyes, MD, Department of Otolaryngology–Head & Neck Surgery, 135 Rutledge Ave, MSC 550, Charleston, SC 29425, USA
Email: graboyes@musc.edu
validated PROM of BID in oncology patients\(^4\) that has been widely used to study BID in HNC\(^5,6,15-18\); BIS scores of ≥10 are considered clinically significant.\(^{19,20}\) Data were collected at enrollment, 1 month postoperatively, and 3 months after treatment completion (surgery or adjuvant therapy).

Statistical analyses were performed using R version 3.2.2. Summary statistics for demographics, clinical measures, and PROMs included frequencies and percentages for categorical variables and median and interquartile range (IQR) for continuous measures. Changes in BIS scores over time were analyzed using a Wilcoxon sign-rank test. Associations between demographics, clinical characteristics, psychosocial and head and neck function, and BID (BIS score ≥10 vs <10) were summarized using odds ratios (ORs) based on fitted simple logistic regression models. Models were adjusted for pretreatment BIS scores (treated as a continuous variable) using multiple logistic regression models. Ninety-five percent confidence intervals for ORs were constructed using a profile likelihood approach to improve interval coverage.\(^{21}\) Summed scores for all PROMs were treated as missing if any individual question for that instrument was missing.

**Results**

Table 1 shows the cohort characteristics. The prevalence of BID (BIS ≥10) increased from 11% (6/53) preoperatively to 25% (13/53) at 1 month after surgery and 27% (14/52) at 3 months after the completion of treatment (\(P < .001\) and \(P = .0014\) for values relative to baseline, respectively). The median pretreatment BIS was 2 (IQR, 0-6), increasing to 4 (IQR, 2-9) at 1 month postoperatively, then 3.5 (IQR, 1.75-10) 3 months after treatment completion (Figure 1). Increases in BIS scores of more than 5 points occurred in 22% of patients (11/51) from baseline to 1 month postoperatively and 23% of patients (11/49) from baseline to 3 months posttreatment. Relative to baseline, 63% of patients (32/51) had higher BIS scores at 1 month postoperatively and 57% (28/49) had higher BIS scores at 3 months posttreatment.

The logistic regression analysis demonstrating the relationship between demographic, clinical, and psychosocial risk factors and BID (BIS ≥10) at 1 month postoperatively and 3 months after treatment is shown in Table 2. Risk factors for BID included female sex, pT 3 to 4 tumors, and higher baseline levels of shame and stigma, depression, and social isolation.

**Discussion**

As the importance of delivering patient-centered HNC care grows, it is imperative to move beyond clinician ratings of disfigurement\(^22,23\) to patient-reported assessments of how HNC affects body image.\(^24,25\) A landmark study by Krouse et al\(^26\) analyzing adaptation following HNC treatment analyzed longitudinal changes in BID, although it employed a nonvalidated outcome measure. Other studies of BID in surgically-treated HNC patients have been cross-sectional in

---

Table 1. Sociodemographic, Clinical, Oncologic, and Psychosocial Characteristics of the Study Cohort (N = 56).

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>No. (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age, median (IQR), y</td>
<td>61 (51.75-71)</td>
</tr>
<tr>
<td>Sex, No. (%)</td>
<td></td>
</tr>
<tr>
<td>Female</td>
<td>21 (38)</td>
</tr>
<tr>
<td>Male</td>
<td>35 (63)</td>
</tr>
<tr>
<td>Race, No. (%)</td>
<td></td>
</tr>
<tr>
<td>White</td>
<td>48 (86)</td>
</tr>
<tr>
<td>African American</td>
<td>7 (13)</td>
</tr>
<tr>
<td>Other</td>
<td>1 (2)</td>
</tr>
<tr>
<td>Insurance, No. (%)</td>
<td></td>
</tr>
<tr>
<td>Private</td>
<td>25 (45)</td>
</tr>
<tr>
<td>Medicare</td>
<td>24 (43)</td>
</tr>
<tr>
<td>Medicaid/self-pay/other</td>
<td>7 (13)</td>
</tr>
<tr>
<td>Marital status, No. (%)</td>
<td></td>
</tr>
<tr>
<td>Married/current partner</td>
<td>33 (59)</td>
</tr>
<tr>
<td>Single/separated/divorced/widowed</td>
<td>23 (41)</td>
</tr>
<tr>
<td>Living situation, No. (%)</td>
<td></td>
</tr>
<tr>
<td>Spouse/partner</td>
<td>36 (64)</td>
</tr>
<tr>
<td>Self</td>
<td>16 (28)</td>
</tr>
<tr>
<td>Parents/children/friends/other</td>
<td>16 (28)</td>
</tr>
<tr>
<td>Educational attainment, No. (%)</td>
<td></td>
</tr>
<tr>
<td>High school or less</td>
<td>20 (36)</td>
</tr>
<tr>
<td>College attendee or graduate</td>
<td>27 (48)</td>
</tr>
<tr>
<td>Graduate school</td>
<td>9 (16)</td>
</tr>
<tr>
<td>Occupational status, No. (%)</td>
<td></td>
</tr>
<tr>
<td>Employed(^c)</td>
<td>15 (27)</td>
</tr>
<tr>
<td>Not employed(^d)</td>
<td>18 (32)</td>
</tr>
<tr>
<td>Retired</td>
<td>23 (41)</td>
</tr>
<tr>
<td>Body mass index (kg/m(^2)), No. (%)</td>
<td></td>
</tr>
<tr>
<td>Underweight</td>
<td>2 (4)</td>
</tr>
<tr>
<td>Normal weight</td>
<td>19 (34)</td>
</tr>
<tr>
<td>Overweight/obese</td>
<td>35 (63)</td>
</tr>
<tr>
<td>Charlson Comorbidity Score, No. (%)</td>
<td></td>
</tr>
<tr>
<td>0</td>
<td>33 (59)</td>
</tr>
<tr>
<td>1</td>
<td>9 (16)</td>
</tr>
<tr>
<td>≥2</td>
<td>14 (25)</td>
</tr>
<tr>
<td>Tumor location and histology, No. (%)</td>
<td></td>
</tr>
<tr>
<td>Oral cavity SCC</td>
<td>33 (59)</td>
</tr>
<tr>
<td>Oropharynx SCC/SCC of unknown primary</td>
<td>8 (14)</td>
</tr>
<tr>
<td>Larynx SCC</td>
<td>4 (7)</td>
</tr>
<tr>
<td>Facial cutaneous malignancy</td>
<td>11 (20)</td>
</tr>
<tr>
<td>p16 status (oropharynx cases only), No. (%)</td>
<td></td>
</tr>
<tr>
<td>p16 negative</td>
<td>3 (38)</td>
</tr>
<tr>
<td>p16 positive</td>
<td>5 (63)</td>
</tr>
<tr>
<td>AJCC pathologic T classification, No. (%)</td>
<td></td>
</tr>
<tr>
<td>0-2</td>
<td>30 (54)</td>
</tr>
<tr>
<td>3-4b</td>
<td>26 (46)</td>
</tr>
<tr>
<td>Ablative surgery, No. (%)</td>
<td></td>
</tr>
<tr>
<td>Mandibulectomy</td>
<td>11 (20)</td>
</tr>
<tr>
<td>Glossectomy</td>
<td>34 (61)</td>
</tr>
<tr>
<td>Maxillectomy</td>
<td>4 (7)</td>
</tr>
<tr>
<td>Radical tonsillectomy/pharyngectomy</td>
<td>4 (7)</td>
</tr>
</tbody>
</table>

(continued)
Our prospective cohort design using a validated PROM of BID thus represents a methodological improvement over prior research. Using this rigorous approach, we expand upon prior work to provide preliminary data that demographic (female sex), oncologic (T-stage, free flap), and baseline psychological, emotional, and social characteristics identify a subset of patients at high risk for BID.

This prospective cohort study using a validated PROM was methodologically sound and conducted with low levels of missing data. Limitations include the single-institution design and lack of long-term follow-up, which should be addressed in future work. The small sample size, which was not determined a priori to measure prespecified changes in BID, limits power to detect small but clinically significant differences. We attempted to maintain high external validity by employing a purposive enrollment strategy and creating a cohort representative of a standard academic HNC practice. However, the heterogeneous inclusion criteria limit internal validity relative to a study with narrowly defined inclusion criteria (eg, T4 oral cavity cancer undergoing free flap reconstruction).

In this prospective cohort pilot study of surgically treated patients with HNC, the prevalence and severity of BID increased at 1 month postoperatively and 3 months post-treatment relative to pretreatment. Demographic, oncologic, and psychosocial characteristics identified high-risk patients. These data will inform the delivery of optimally timed, targeted, preventative, and therapeutic interventions.

**Author Contributions**

**Evan M. Graboyes**, substantial contributions to the conception and design of the work, drafting the work and revising it critically for important intellectual content, final approval of the version to be published, agreement to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved;

**Elizabeth G. Hill**, analysis and interpretation of data for the work, drafting the work and revising it critically for important intellectual content, final approval of the version to be published, agreement to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved;

**Courtney H. Marsh**, the acquisition and interpretation of data for the work, drafting the work and revising it critically for important intellectual content, final approval of the version to be published, agreement to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved;

**Stacey Maurer**, the analysis and interpretation of data for the work, revising the work critically for important intellectual content.
Table 2. Risk Factors for Body Image Disturbance (Body Image Scale Score ≥ 10) at 1 Month Postoperatively and 3 Months Posttreatment.*

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>BIS Score ≥ 10 at 1 Month Postoperatively</th>
<th>BIS Score ≥ 10 at 3 Months Posttreatment</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Unadjusted</td>
<td>Adjusted&lt;sup&gt;c&lt;/sup&gt;</td>
</tr>
<tr>
<td></td>
<td>OR (95% CI)</td>
<td>Reference</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Reference</td>
</tr>
<tr>
<td>Sex</td>
<td>51</td>
<td>49</td>
</tr>
<tr>
<td>Male</td>
<td>Reference</td>
<td>Reference</td>
</tr>
<tr>
<td>Female</td>
<td>2.25 (0.59-8.7)</td>
<td>2.20 (0.48-10.6)</td>
</tr>
<tr>
<td>Age, y</td>
<td>51</td>
<td>49</td>
</tr>
<tr>
<td>40+</td>
<td>Reference</td>
<td>Reference</td>
</tr>
<tr>
<td>&lt;40</td>
<td>7.6 (0.66-173.7)</td>
<td>4.9 (0.24-142.7)</td>
</tr>
<tr>
<td>Marital status</td>
<td>51</td>
<td>49</td>
</tr>
<tr>
<td>Married/current partner</td>
<td>Reference</td>
<td>Reference</td>
</tr>
<tr>
<td>Single, divorced, separated, widowed</td>
<td>0.43 (0.09-1.7)</td>
<td>0.32 (0.04-1.6)</td>
</tr>
<tr>
<td>BMI</td>
<td>51</td>
<td>49</td>
</tr>
<tr>
<td>Overweight or obese</td>
<td>Reference</td>
<td>Reference</td>
</tr>
<tr>
<td>Underweight or normal</td>
<td>1.6 (0.41-6.1)</td>
<td>1.9 (0.39-9.5)</td>
</tr>
<tr>
<td>AJCC Pathologic T Classification</td>
<td>51</td>
<td>49</td>
</tr>
<tr>
<td>0, 1, or 2</td>
<td>Reference</td>
<td>Reference</td>
</tr>
<tr>
<td>3 or 4a</td>
<td>8.9 (2.0-63.7)</td>
<td>19.6 (2.8-352.3)</td>
</tr>
<tr>
<td>Reconstructive surgery</td>
<td>51</td>
<td>49</td>
</tr>
<tr>
<td>None or dermal</td>
<td>Reference</td>
<td>Reference</td>
</tr>
<tr>
<td>Substitute rotational flap</td>
<td>4.7 (0.16-144.5)</td>
<td>11.1 (0.25-832.8)</td>
</tr>
<tr>
<td>Microvascular free flap reconstruction</td>
<td>6.4 (1.0-123.3)</td>
<td>21.5 (1.7-1341.8)</td>
</tr>
<tr>
<td>Pretreatment Shame and Stigma Scale</td>
<td>50</td>
<td>48</td>
</tr>
<tr>
<td>90, 100</td>
<td>1.06 (1.01-1.13)</td>
<td>1.06 (0.19-6.07)</td>
</tr>
<tr>
<td>Pretreatment PROMIS Emotional Distress–Anxiety SF4a</td>
<td>50</td>
<td>48</td>
</tr>
<tr>
<td>90, 100</td>
<td>1.15 (0.98-1.39)</td>
<td>1.00 (0.80-1.25)</td>
</tr>
<tr>
<td>Pretreatment PROMIS Emotional Distress–Depression SF4a</td>
<td>50</td>
<td>48</td>
</tr>
<tr>
<td>90, 100</td>
<td>1.25 (1.06-1.51)</td>
<td>1.08 (0.85-1.36)</td>
</tr>
<tr>
<td>Pretreatment PROMIS Satisfaction with Social Roles and Activities SF4a</td>
<td>51</td>
<td>49</td>
</tr>
<tr>
<td>90, 100</td>
<td>0.88 (0.77-0.98)</td>
<td>0.94 (0.82-1.10)</td>
</tr>
<tr>
<td>Pretreatment PROMIS Social Isolation SF4a</td>
<td>51</td>
<td>49</td>
</tr>
<tr>
<td>90, 100</td>
<td>1.21 (1.01-1.49)</td>
<td>1.05 (0.79-1.34)</td>
</tr>
<tr>
<td>Pretreatment Performance Status–Head and Neck, average across subscales</td>
<td>50</td>
<td>48</td>
</tr>
<tr>
<td>90, 100</td>
<td>0.98 (0.95-1.02)</td>
<td>1.00 (0.97-1.05)</td>
</tr>
<tr>
<td>Performance Status Scale–Head and Neck, Normalcy of Diet</td>
<td>50</td>
<td>48</td>
</tr>
<tr>
<td>90, 100</td>
<td>Reference</td>
<td>Reference</td>
</tr>
<tr>
<td>0, 10, . . . , 80</td>
<td>1.09 (0.21-4.65)</td>
<td>0.79 (0.11-4.31)</td>
</tr>
<tr>
<td>Performance Status Scale–Head and Neck, Public Eating</td>
<td>50</td>
<td>48</td>
</tr>
<tr>
<td>75, 100</td>
<td>Reference</td>
<td>Reference</td>
</tr>
<tr>
<td>0, 25, 50</td>
<td>2.06 (0.37-9.81)</td>
<td>1.00 (0.12-6.14)</td>
</tr>
<tr>
<td>Performance Status Scale–Head and Neck, Understandability of Speech</td>
<td>51</td>
<td>49</td>
</tr>
<tr>
<td>75, 100</td>
<td>Reference</td>
<td>Reference</td>
</tr>
<tr>
<td>0, 25, 50</td>
<td>2.27 (0.40-11.18)</td>
<td>1.22 (0.12-8.35)</td>
</tr>
</tbody>
</table>

Abbreviations: AJCC, American Joint Committee on Cancer; BIS, Body Image Scale; BMI, body mass index; CI, confidence interval; OR, odds ratio.

*Bold values are statistically significant.

*N < 56 for certain patient-reported outcome measures (PROMs; PROMs were treated as missing if any individual question for that instrument was missing).

*Adjusted for pretreatment Body Image Scale scores (treated as a continuous variable) using multiple logistic regression models.
final approval of the version to be published, agreement to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated; **Terry A. Day**, the analysis and interpretation of data for the work, revising the work critically for important intellectual content, final approval of the version to be published, agreement to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated; **Katherine R. Sterba**, the acquisition, analysis, and interpretation of data for the work, revising the work critically for important intellectual content, final approval of the version to be published, agreement to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated.

**Disclosures**

**Competing interests:** None.

**Sponsorships:** None.

**Funding source:** American Cancer Society grant ACS IRG-16-185-17 to Evan Graboyes, National Cancer Institute grant P30 CA138313 to the Biostatistics Shared Resource of the Hollings Cancer Center. Neither funding organization had no role in the design and conduct; collection, analysis, and interpretation of the data; or writing or approval of the manuscript.

**References**


